

LOUISIANA DEPARTMENT OF NATURAL RESOURCES
OFFICE OF CONSERVATION
RADIOACTIVE TRACER GUIDELINES AND PROCEDURES
for Disposal Wells Completed With Tubing and Packer

The purpose of running a radioactive tracer survey (RTS) in a disposal well completed with tubing and packer is twofold:

1. To show whether injected fluids will leak through a hole or holes in the casing above the perforations; and
2. To show whether injected fluids will migrate vertically outside the casing after reaching the perforations.

GUIDELINES:

- A. The gamma-ray log may be run up to 60 ft/min at a Time Constant of 1 second (suggested) or up to 30 ft/min at Time Constant 2 or up to 15 ft/min at Time Constant 4. Indicate logging speed and Time Constant on the log heading.
- B. Include a collar locator for depth control.
- C. Vertical scale may be 2" or 5" per 100 ft; 2" being preferred.
- D. Indicate the horizontal scale in API units. It is suggested that two gamma-ray curves at different sensitivities (such as one at 20 API units per division and one at 100 API units per division) be recorded on each log pass. If only one gamma-ray curve is recorded, make sure the sensitivity used is such that the tracer material will be obvious when detected and will not be confused with normal "hot spots" in the formations; i.e., choose a low sensitivity. It need not be sensitive enough to show lithology.
- E. Indicate beginning and ending clock times on each log pass.
- F. Indicate injection rate (if any) during each log pass.
- G. Indicate volume of water injected between log passes.
- H. Indicate injection pressures required to displace the radioactive slug between log passes.
- I. Indicate volume and concentration of each slug of tracer material.

If preferred, most of the above may be shown in tabular form rather than on the log, as long as all information is provided (the Injection & Mining Division will provide forms on request).

PROCEDURES:

1. Run a base log from at least 200 feet below the perforations or the total depth of the well to at least 200 ft above the packer.
2. Release tracer material, either liquid or water soluble Iodine 131, from the tool into the tubing about 100 ft above packer depth. Trace the slug with the gamma-ray tool by running short overlapping passes while following the tracer downhole. Each pass should extend from at least 100 ft below the slug to at least 100 ft above the top of the previously recorded slug depth (above the point where the gamma ray count returned to baseline levels on the previous run). Although it is difficult to determine the number of passes needed, the complete pathway followed by all of the tracer material needs to be demonstrated. At a minimum, the following passes should be made:

- a) Upon release of the radioactive material a pass should be made from 100 ft below the slug to at least 100 ft above the position of the top of the slug.
- b) The slug should then be pumped to the packer (inside the tubing) and a logging pass made from 100 ft. below the slug to 100 ft. above the position of the top of the slug.
- c) The slug should then be pumped below the packer but above the perforations and a pass made from 100 ft below the slug to 100 ft above the position of the top of the slug on the previous pass.
- d) Continue the pumping/logging sequence until the slug reaches the perforations. A pass should be made from 100 ft below the slug to 200 ft above the packer depth.
- e) Continue the pumping/logging sequence (from 100 ft below the slug to at least 100 ft above the perforations) until the radioactive material virtually disappears. The volumes of fluid pumped between the logging passes should be consistent. The last pass should essentially duplicate the base log.

Do not pump during logging; that is, pump only to move tracer down hole between log passes. Be cautious of the volume of water pumped during or between log passes to prevent premature loss of the tracer! If the tracer has been prematurely lost, it will be necessary to pump away the slug, inject another slug and follow it from the point of the last good log pass.

- 3) As soon as the tracer reaches the perforations, stop pumping and run a log from 100 ft below the slug to 200 ft above the packer depth.
- 4) As tracer is pumped out of the perforations into the well bore, run a few short passes from at least 100 ft below the slug to at least 100 ft above the perforations showing the pathway the tracer follows. Continue running passes until the tracer virtually disappears. Do not pump a large volume between passes to "pump away" the slug. The last pass should essentially duplicate the base log.
- 5) Each pass must be submitted on a separate log segment with collar locator. A merged log may be submitted in addition to the separate log passes.
- 6) An interpretation of the log must be supplied by the logging company on the log itself.
- 7) Include a schematic diagram of the well on the log itself. The diagram should show the casing diameters and depths, tubing diameter and depth (if any), perforated intervals, and total or plugged back depth.
- 8) Write the Serial Number of the well on the log heading, if available.

NOTE: The above "Guidelines" and "Procedures" will apply in most instances. In certain situations, it will be necessary to deviate from these directions. Necessary modifications may be made as long as the two purposes stated at the top can be demonstrated as evidence of well integrity. For questions, call 504/342-5515 weekdays.

Send two copies of the complete log to:

Office of Conservation
Injection & Mining Division
P.O. Box 94275
Baton Rouge, LA 70804-9275